

COMMONWEALTH OF VIRGINIA
Department of Environmental Quality
Northern Regional Office

STATEMENT OF LEGAL AND FACTUAL BASIS

Mirant Potomac River Generating Station
Alexandria, Virginia
Permit No. 70228

State Operating Permit

October 19, 2007

I. Purpose

The Virginia Department of Environmental Quality (VDEQ) – Division of Air Quality has been requested by the State Air Pollution Control Board (Board) to develop a comprehensive State Operating Permit which establishes emission limitations for sulfur dioxide (SO₂), nitrogen oxides (NO_x), total particulate matter (PM), particulate matter equal to or less than ten microns (PM₁₀), particulate matter equal to or less than two and one half microns (PM_{2.5}), volatile organic compounds (VOC), carbon monoxide (CO), and the acid gases hydrochloric acid (HCl), and hydrogen fluoride (HF) on both a short-term and an annual basis that are protective of the National Ambient Air Quality Standards (NAAQS) for the operation of five coal-fired boilers at the Mirant Potomac River, LLC's Potomac River Generating Station (PRGS) facility. This document sets forth the background information used to create a record of the engineering evaluation for the proposed permit.

The emission limitations established in this permit have been demonstrated to be protective of the SO₂ 3-hour, 24-hour, and annual NAAQS through the use of the most up to date version of AERMOD. The permit also requires the use of Continuous Emission Monitor Systems (CEMS) for SO₂, NO_x, (CO), carbon dioxide (CO₂) and/or oxygen (O₂), to demonstrate compliance with all emission limitations of this State Operating Permit.

II. Facility Background

The PRGS is a 482-MW electricity generating facility located on the Potomac River in Alexandria, Virginia. Mirant Potomac River, LLC (formerly Southern Energy Potomac River, LLC) purchased the PRGS from the Potomac Electric Power Company (PEPCO) in December 2000. Electricity generated at the facility is transmitted to the Pennsylvania/New Jersey/Maryland (PJM) distribution grid and services Washington D.C. for use by a variety of customers including federal agencies, businesses, residences, and the D.C. Water and Sewer Authority's Blue Plains Wastewater Treatment Plant.

The facility consists of five tangentially-fired boilers (designated as boilers C1, C2, C3, C4, and C5), each supplying steam to a boiler specific steam turbine connected to a dedicated electrical generator for that boiler. Each boiler utilizes coal as the primary which is delivered by rail car to the facility. Boilers C1 and C2 are cycling boilers that offer more flexibility in how they are dispatched. Cycling boilers can be brought online quickly to respond to increases in demand. Boilers C3, C4 and C5 are considered base load boilers and are called into service more often than boilers C1 and C2. The base load boilers typically run 24 hours a day. In addition to the primary fuel, No. 2 fuel oil is stored in two aboveground storage tanks and is used to provide ignition, warm-up, and flame stabilization for the boilers.

Each boiler's gas stream is discharged into the atmosphere through a dedicated stack for that boiler. The five stacks are identical and are each 161 feet above ground level.

Summary of PRGS Combustion Boilers

Boiler ID	Manufacturer	Description	Maximum Rated Input Heat Capacity (MMBtu/hr)	Generation Capability (MW)	Began Service
C1	Combustion Engineering, Inc.	Natural circulation, tangentially coal-fired with superheater and economizer	1053	93	1949
C2	Combustion Engineering, Inc.	Natural circulation, tangentially coal-fired with superheater and economizer	1029	93	1950
C3	Combustion Engineering, Inc.	Controlled circulation, tangentially coal-fired with superheater, single reheater and economizer	1018	108	1954
C4	Combustion Engineering, Inc.	Controlled circulation, tangentially coal-fired with superheater, single reheater and economizer	1087	108	1956

C5	Combustion Engineering, Inc.	Controlled circulation, tangentially coal-fired with superheater, single reheater and economizer	1107	108	1957
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The facility is a Title V major source of sulfur dioxide (SO₂), nitrogen dioxide (NO₂), particulate matter equal to or less than ten microns in diameter (PM₁₀), and carbon monoxide (CO). This facility is also located in a nonattainment area for the 8-hour ozone standard (“moderate” classification) and a nonattainment area for particulate matter equal to or less than 2.5 microns in diameter (PM_{2.5}) (no classification assigned by EPA at this time). The area is in attainment of the standards for all other pollutants. The VDEQ Northern Regional Office is currently drafting the Title V permit and Statement of Basis for the facility.

Because the boilers were constructed between 1949 and 1957 and the requirements of 40 CFR 60, Subparts, D, Da, and Db were not effective for units earlier than August 17, 1971, these units are “grandfathered”, therefore there are no NSR permits applicable to this source. The facility entered into a consent order with VDEQ on July 10, 1998, to establish Reasonable Available Control Technology (RACT) for NO_x as required by the Virginia State Implementation Plan. A state operating permit dated June 5, 2000, was issued to the facility to establish RACT for VOC. The facility is also regulated under a Phase II Acid Rain Permit dated February 28, 2003, and a State Operating Permit dated September 29, 2000, for control of NO_x during the ozone control season, May 1st through September 30th. In 2005 the facility submitted modeling results from the “downwash study” which indicated an exceedance of the SO₂ NAAQS. As a result of this modeling result the facility was issued a administrative consent order by EPA which required that modeling be conducted each day and the operational scenarios developed for the following day’s operation which would insure that the NAAQS would not be exceeded. This operational requirement expired on May 31, 2007 and VDEQ issued a State Operating Permit dated June 1, 2007, that sets hourly limits on SO₂ and an annual SO₂ limit of 3813 tpy.

II. Pollution Controls

Each boiler (C1, C2, C3, C4, and C5) has a hot-side and a cold-side electrostatic precipitator (ESP) on its boiler exhaust gas stream to control particulate emissions.

Mirant installed Low-NO_x Burners (LNB) on all boilers (C1, C2, C3, C4, and C5) and Separated Over-Fire Air (SOFA) technology on boilers C3, C4, and C5 as a result of a 2004 judicial consent decree. This consent decree became enforceable on April 20, 2007.

The use of LNBs limits the formation of NO_x by controlling the stoichiometric and temperature profiles of the combustion process in each burner zone. Emissions are controlled by the design of the LNB which may reduce oxygen levels in the combustion

zone (limits fuel NO_x formation), reduce flame temperature (limits thermal NO_x formation), and/or reduce residence time at peak temperature (limits thermal NO_x formation).

SOFA is a technique that involves removing a percentage of combustion air and adding excess air above the burners. This limits thermal NO_x by partially delaying and extending the combustion process resulting in less intense combustion and lower flame temperatures. It also suppresses the fuel NO_x formation by reducing the concentration of air in the combustion zone where volatile fuel nitrogen is evolved. SOFA can reduce NO_x by 20 to 30 percent from uncontrolled levels and can be turned off.

Beginning in 2005 Mirant employed the use of Trona to reduce SO₂ emissions from the facility, which dispersion modeling had shown to be a contributor to a predicted exceedance of the NAAQS. Trona is a naturally occurring mineral (sodium sesquicarbonate), which is non-flammable and similar to baking soda. It has been used in dry sorbent injection systems where it reacts with acid gases to form a non-corrosive product that will not damage the equipment. When injected into the combustion exhaust gas stream, the dry powder also forms a bond with SO₂. The compounded particulate material is then removed from the exhaust gas by existing emissions control equipment and collected with the ash. Test results at PRGS indicate that Trona injection could consistently remove a significant portion of the SO₂ from exhaust gas, increase the efficiency of the control device in reducing particulate emissions, and provide a reduction in the acid gases HCl and HF. Particulate matter can also form in the atmosphere with the emitted gases, such as sulfur dioxide which will condense to create sulfate particles; so when the amount of sulfur dioxide decreases, the amount of condensable particulate matter is reduced accordingly.

III. Permit Description

<u>Permit Condition</u>	<u>Purpose and Basis of the Condition</u>
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| 1. | Specifies the emitting boilers to which the permit conditions apply. In this case, the boilers are all of the boilers supplying steam for electric power generation. |
| 2. | The type of NO _x emissions control (low-NO _x burners) required for boilers C1 and C2 are specified in this condition. |
| 3. | The type of NO _x emissions control (low-NO _x burners and separated over-fire air; SOFA), required by the Consent Decree, that has been installed on C3, C4, and C5 are specified in this condition. |
| 4. | Describes the emission control for SO ₂ and acid gases. |
| 5. | Describes the emission controls for PM from the boilers C1 through C5. |
| 6. | Describes the emission controls for PM from the two fly ash silos. |

7. Describes the emission controls for PM from the bottom ash silo.
8. Describes the emission controls for PM from fly ash and bottom ash truck transfer operation.
9. Describes the emission controls for PM from the coal handling operations.
10. Describes the emission controls for PM from the dry sorbent handling systems.
11. Describes the electrostatic precipitator's designations and operational requirements.
12. Describes the fugitive dust control requirements for the facility.
13. States compliance with opacity limits in the State Operating Permit may be determined by continuous opacity monitoring. Mirant already has continuous opacity monitors and with the recent incorporation in the Virginia regulations the opacity monitors may now be used as a direct compliance tool.
14. States that compliance will be determined by continuous emissions monitoring and specifies the requirements for installation, operation, maintenance, and quality assurance of the CEMS. Mirant already has CEMS for purposes of determining compliance with Acid Rain and reasonably available control technology (RACT) provisions of the Clean Air Act. Monitoring requirements for the Acid Rain provisions of the Clean Air Act are covered in Part 75 of Title 40 of the Code of Federal Regulations (CFR). To maintain consistency between Mirant's obligation to meet the Acid Rain requirements for CEMS and those of this permit, this condition also requires that the monitoring be done in accordance with Part 75.
15. Requires the installation, operation, maintenance, and quality assurance for CO CEMS. Also, within this condition there is a requirement to collect six months of CO data to be used in establishing a permitted CO emission limit.
16. States that the permittee must calculate monthly emissions of pollutants which do not have CEMS from each of the boilers C1 through C5 to determine compliance with the boiler specific limitations of Conditions 23 through 27.
17. Sets the requirement to operate, maintain, and record the pressure drop across the fabric filters installed on the fly ash and bottom ash silos.
18. Requires that the permittee conduct a condition assessment of the hot and cold side ESPs on a daily basis. This assessment is required to insure that the ESPs are in proper operating condition.
19. Requires the permittee to make daily evaluations of the monitoring devices installed to insure the proper operation and that all emission sources are within the limits set forth in this State Operating Permit. This condition also specifies corrective action to be taken by the permittee should malfunctions or exceedance be discovered.
20. Specifies the approved fuel.
21. Sets the specification of all fuels and the analysis method accepted by DEQ.

22. Requires the permittee to obtain and maintain fuel certifications from the fuel suppliers. The information required in this certification is also delineated.
23. Establishes the emission limits for boiler C1. Emissions are prescribed specific to the pollutant and the averaging period for that pollutant. These limits are derived from the estimated overall emission contribution from the operating limits. Emission limitations for SO₂ have been established based on the most up to date atmospheric dispersion modeling utilizing AERMOD (Model Version 07026) and uses (Equivalent Building Dimensions) as input to the model. The EBD were derived from a wind tunnel study which was specific to the building configuration at PRGS.
24. Establishes the emission limits for boiler C2. Emissions are prescribed specific to the pollutant and the averaging period for that pollutant. These limits are derived from the estimated overall emission contribution from the operating limits. Emission limitations for SO₂ have been established based on the most up to date atmospheric dispersion modeling utilizing AERMOD (Model Version 07026) EBD (Equivalent Building Dimensions). This version of AERMOD utilizes building cavity algorithms derived from a wind tunnel study which was specific to the building configuration at PRGS.
25. Establishes the emission limits for boiler C3. Emissions are prescribed specific to the pollutant and the averaging period for that pollutant. These limits are derived from the estimated overall emission contribution from the operating limits. Emission limitations for SO₂ have been established based on the most up to date atmospheric dispersion modeling utilizing AERMOD (Model Version 07026) EBD (Equivalent Building Dimensions). This version of AERMOD utilizes building cavity algorithms derived from a wind tunnel study which was specific to the building configuration at PRGS.
26. Establishes the emission limits for boiler C4. Emissions are prescribed specific to the pollutant and the averaging period for that pollutant. These limits are derived from the estimated overall emission contribution from the operating limits. Emission limitations for SO₂ have been established based on the most up to date atmospheric dispersion modeling utilizing AERMOD (Model Version 07026) EBD (Equivalent Building Dimensions). This version of AERMOD utilizes building cavity algorithms derived from a wind tunnel study which was specific to the building configuration at PRGS.
27. Establishes the emission limits for boiler C5. Emissions are prescribed specific to the pollutant and the averaging period for that pollutant. These limits are derived from the estimated overall emission contribution from the operating limits. Emission limitations for SO₂ have been established based on the most up to date atmospheric dispersion modeling utilizing AERMOD (Model Version 07026) EBD

(Equivalent Building Dimensions). This version of AERMOD utilizes building cavity algorithms derived from a wind tunnel study which was specific to the building configuration at PRGS.

28. Establishes the emission limits while the facility is operating under a multiple boiler operating scenario. This condition would establish the emission limits for the facility in most situations since the facility rarely operates only one boiler. SO₂ emission limitations have been established for a variety of boiler operating scenarios in this condition of the State Operating Permit. These limits are derived from the estimated overall emission contribution from the operating limits. The emission limitations established in this permit have been demonstrated to be protective of the SO₂ 3-hour, 24-hour, and annual National Ambient Air Quality Standards through the use of the most up to date version of AERMOD.

Emissions limitations for NO_x, PM, PM₁₀, PM_{2.5}, volatile organic compounds (VOC), carbon monoxide (CO), hydrochloric acid (HCl), and hydrogen fluoride (HF) were developed using the worst-case scenario of operating combination of boilers which would exhibit the highest ambient impact and are described in this condition and in Condition 30 of this State Operating Permit. A more detailed discussion of the development of the modeling for this condition will be discussed in Attachment A.

29. Requires the permittee to calculate the annual emissions from the boilers C1 through C5, in tons per year, to demonstrate compliance with the limits in Condition 30.
30. Establishes the annual emissions allowed for the facility. These limits are derived from the estimated overall emission contribution from the operating limits. Annual emissions are capped at 3,813 tons of SO₂ from the facility as established in the June 1, 2007 State Operating Permit and set out in Condition 30 of this State Operating Permit. Additionally, annual emissions of NO_x are capped at 3,700 tons per year from the facility and are set out in Condition 30 of this State Operating Permit. Furthermore, the facility is limited to 1,600 tons of NO_x during the ozone seasons (effective until December 31, 2008). These conditions are set in Condition 30 of this State Operating Permit.
31. Establishes the visible emission limit for the bottom ash silo based on the fabric filter venting directly to the atmosphere. This is not the case for the two fly ash silos since the exhaust from these fabric filters are directed to the boiler C1 ESP and therefore do not exhaust directly into the atmosphere.
32. Establishes visible emission limits for boilers C1 through C5 and the methods to be used in this determination. With the adoption of the Virginia law effective July 2007, the use of COMS as a direct compliance tool is specified in this condition.

33. Defines performance testing, notification, and reporting requirements of boilers C1 through C5 for pollutants which are not being monitored on a continuous basis using CEMS. Additionally, there are specific requirements for data collection during the performance test which will be used as future surrogate to determine control device operation. Also, should the permittee elect to use a lower fuel sulfur content in the coal, there are specific requirements defined for the approval of this fuel switch.
34. Defines initial visible emission evaluation procedures for boilers C1 through C5. The optional methods, as stated earlier, are allowed in this condition and the notification and reporting requirements are established.
35. Establishes the requirements for annual performance testing along with reporting requirements.
36. Defines and establishes the requirement for record keeping. A proposed listing of records to be maintained by the facility and the authority to use off-site electronically stored data is included, as long as the data is accessible from the facility.
37. Defines the prerequisites of the CEMS performance evaluations along with reporting and logistical requirements for completing this testing program.
38. Establishes quality control requirements for the CEMS.
39. Defines the minimum quarterly reporting requirements.
40. Defines the minimum semi-annual reporting requirements.
41. Authorizes local, state, and federal representatives the right to enter the facility to assess the status of compliance.
42. Requires the facility to operate and maintain the boilers and emission control equipment in a manner consistent with good air pollution control practices for minimizing emissions as defined in this permit. Within this condition the permittee is required to maintain records and parts to meet the intent of the condition.
43. Requires maintenance of records of occurrences and duration of specific conditions which would result in an emission exceedance of a specific duration and any action resulting from this activity.
44. Requires the permittee to notify VDEQ of any equipment or control equipment malfunctions and sets the time requirements and information to be included for these notifications.
45. Requires the permittee to reduce the level of operation or shut down the boilers if the Board determines this is necessary to prevent the violation of any NAAQS.
46. Requires that the permittee notifies any new owner of the facility about this permit and sends a copy of the notice to VDEQ. The VDEQ would then make the

necessary administrative amendments to the permit to show that it is transferred to the new owner.

46. States that a copy of the permit must remain on the premises. Besides being a regulatory requirement, it serves as a reminder to the facility staff of other obligations as well as assuring the availability of inspection of the permit by DEQ personnel and others.

IV. Best Available Control Technology Review (BACT) Applicability (9 VAC 5-50-260)

A BACT applicability evaluation is not required for State Operating Permits.

V. New Source Performance Standards (NSPS)-9 VAC 5 Chapter 50, Part II, Article 5

The PRGS is not subject to 40 CFR 60 Subpart D – Fossil Fuel Steam Generators or to Subpart Da – Electric Utility Steam Generating Units. Both NSPS apply to fossil fuel-fired steam generators that are greater than 250 MMBtu/hr and that commenced construction or modification after August 17, 1971, for Subpart D and September 18, 1978, for Subpart Da. Additionally, the PRGS is not subject to 40 CFR Subpart Db because all of the boilers began construction prior to June 19, 1984. All five boilers at the PRGS were constructed between 1949 and 1957 and have not previously been subject to either NSPS. Modification is defined in the NSPS regulations as physical or operational changes that result in an increase in hourly rates of emissions.

VI. National Emission Standards for Hazardous Air Pollutants (NESHAPS) - 9 VAC 5 Chapter 60, Part II, Article 1 –

There is no applicable NESHAP for steam generating units.

VII. Maximum Achievable Control Technology (MACT) - 9 VAC 5 Chapter 60, Part II, Article 2

There are no applicable MACT requirements for steam generating units.

Future Applicable Requirements

The PRGS will be subject to the NO_x requirements of the Clean Air Interstate Rule (CAIR) on January 1, 2009. The Clean Air Mercury Rule (CAMR) and the SO₂ requirements of CAIR are effective on January 1, 2010. Under Phase I of CAIR, the facility will be allocated 711 tons of NO_x emissions during the ozone season, 1,734 tons of NO_x annually, and 6,025 tons of SO₂ annually. The facility will be allocated 72.37 lbs of mercury under Phase I of CAMR.

The facility will not be subject to the requirements of Best Available Retrofit Technology (BART) in EPA's Regional Haze Rule because all boilers were constructed between 1949

and 1957 and the BART applies to units constructed after August 7, 1962 but prior to August 7, 1977.

VIII. Toxic Pollutants

The facility is not subject to the state toxics rule. Regulation 9 VAC 5-60-300 C.5 exempts stationary sources that EPA has made a formal determination will not be regulated under §112 of the Clean Air Act. The facility will be subject to CAMR which is established under §129.

IX. Title V Review - 9 VAC 5 Chapter 80, Article 1

The facility is a Title V major source of sulfur dioxide (SO₂), nitrogen dioxide (NO₂), particulate matter (PM₁₀), and carbon monoxide (CO). The VDEQ-Northern Virginia Regional Office is currently drafting the Title V permit and Statement of Basis for the facility. All applicable requirements resulting from this State Operating Permit will be incorporated into the Title V permit.

X. Public Participation

Following a 30 day comment period, a public hearing will be held. The public comment period will begin on October 19, 2007, and conclude at the end of the public hearing on November 19, 2007.

APPENDIX A
MODELING MEMORANDUM



MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY *Office of Air Data Analysis and Planning*

629 East Main Street, Richmond, VA 23219
8th Floor

804/698-4000

To: Terry Darton, Air Permit Manager (NRO)

From: Mike Kiss, Coordinator - Air Quality Assessments Group (AQAG)

Date: October 18, 2007

Subject: Virginia Department of Environmental Quality (DEQ) Technical Review of the Air Quality Analyses in Support of the "Existing 5-Stack" Comprehensive State Operating Permit for the Mirant – Potomac River Generating Station (PRGS)

Copies: Tamera Thompson

1. Project Background

Mirant Potomac River, LLC (Mirant) submitted a modeling analysis (conducted by its consultant ENSR) of the PRGS on September 25, 2007 pursuant to a request from the Department of Environmental Quality (DEQ). The modeling assessment was performed to demonstrate compliance with the National Ambient Air Quality Standards (NAAQS) for criteria pollutants (SO₂, NO₂, PM₁₀ and CO) and to evaluate impacts from toxic pollutants (HCl, HF and Hg). Amendments to the modeling analysis were received by DEQ on September 26 and 28, 2007 and October 2 and 3, 2007. The results of these analyses will be used to support permit development.

This memo documents the procedures and results of the modeling analysis conducted for the existing 5-stack plant configuration.

2. Modeling Methodology and Results

All air quality modeling analyses conducted conform to 40 CFR Part 51, Appendix W - Guidelines on Air Quality Models. The modeling analysis generally conforms to the framework established in a protocol dated *Revised Protocol for Modeling Ambient Pollutant Concentrations from the Existing Stacks and from the Proposed Stack Merge Project at the Potomac River Power Plant (July 2007)*.

Dispersion modeling was conducted for the existing 5-stack configuration. Continuous emissions monitor (CEM) data and Relative Accuracy Test Audit (RATA) data were reviewed for 2004-2006, and the most representative data were selected for stack parameters to use in the modeling. Specifically, the annual CEM data was reviewed to find the year in which the worst-case flow occurred and was consistent (either all high or low) for the three load ranges tested. Once the year was determined, RATA results were reviewed to find the years in which the flows were consistent in their relative accuracies. By this, staff reviewed the monitor accuracy relative to the EPA reference method and determined which years the monitors were consistently in the same direction (i.e., the bias adjustment factor affected each load range in the same direction, all flow data was either corrected up or down) and in those years in which all three load ranges were tested. Once all this information was matched it was determined that for units C1 and C2 the most representative year of data was 2004 and for units C3, C4, and C5, the most representative year was 2005. This grouping had nothing to do with cycling vs. base load units and was strictly a coincidence. Additional technical information on stack parameters and CEM data are provided in Attachment A.

Each pollutant modeled for the existing 5-stack plant configuration is discussed in detail below. Several load scenarios were modeled, including minimum, mid-range and maximum load conditions.

2.1.1. Sulfur Dioxide (SO₂)

The following six-step process was used to evaluate compliance with the SO₂ NAAQS and to identify the associated complying emission rates:

1. Twenty-five separate scenarios varying the units operating were developed to model PRGS. Within those twenty-five scenarios, additional cases varying the hours of operation for each unit were developed, for a total of 120 modeled cases.
2. The 120 cases were modeled to develop a complying lb SO₂/MMBtu emission rate for each case. Complying emission rates were based on the following short-term concentration thresholds:

$$\begin{aligned} \text{3-Hour: } & 1300 \mu\text{g}/\text{m}^3 \text{ (NAAQS)} - 175 \mu\text{g}/\text{m}^3 \text{ (Monitored Background)} = 1124 \mu\text{g}/\text{m}^3 \\ \text{24-Hour: } & 365 \mu\text{g}/\text{m}^3 \text{ (NAAQS)} - 55 \mu\text{g}/\text{m}^3 \text{ (Monitored Background)} = 310 \mu\text{g}/\text{m}^3 \end{aligned}$$

3. It was necessary to include nearby sources that could cause a significant concentration gradient in the vicinity of PRGS in addition to adding the aforementioned background air

quality values. To reduce model run time, the following cases, which produced the most restrictive 3-hour and 24-hour complying rates, were selected for cumulative SO₂ modeling:

Ground Level Receptors 3-hour: Case 7d, 0.35 lb/MMBtu
 24-hour/Annual: Case 7d, 0.36 lb/MMBtu

Marina Towers Receptors 3-hour: Case 7a, 0.27 lb/MMBtu
 24-hour/Annual: Case 7f, 0.23 lb/MMBtu

It is important to note that previous modeling indicated that 24-hour complying emission rates were more restrictive than annual emission rates; therefore, modeling for the annual averaging period assumed 24-hour complying rates.

4. PRGS was modeled along with the SO₂ cumulative emissions inventory at receptors within 50 kilometers (km) where PRGS had a significant concentration to determine any potential NAAQS violations.
5. The most restrictive PRGS emission rates produced some modeled NAAQS violations where PRGS significantly contributed; therefore, new complying PRGS emission rates were determined to eliminate predicted violations or reduce PRGS impacts to less than the SO₂ Significant Impact Level (SIL). The following new complying rates were found:

Ground Level Receptors 3-hour: Case 7d, reduced by 29% to 0.25 lb/MMBtu
 24-hour: Case 7d, reduced by 8% to 0.33 lb/MMBtu
 Annual: Case 7d, reduced to 0.29 lb/MMBtu

Marina Towers Receptors 3-hour: Case 7a, 0.27 lb/MMBtu (no change, no violations)
 24-hour: Case 7f, reduced by 9% to 0.21 lb/MMBtu
 Annual: Case 7f, 0.23 lb/MMBtu (no change, no violations)

Cumulative modeling results can be found in Attachment B
(SO₂_Cumulative_Inventory_Results_DEQ.xls).

6. Emission rates for the remainder of the 120 modeling cases were reduced by the percentages listed above. Final complying lb/MMBtu emission rates (including the reductions) and associated lb/hr and tpy rates are shown in Attachment B (SO₂_ExistingStacks_DEQ.xls).

2.1.2. Particulate Matter (PM₁₀)

The following three-step process was used to evaluate compliance with the PM₁₀ NAAQS and to identify the associated complying emission rates:

1. To reduce the total number of PM₁₀ modeling runs (and expedite model run time), PRGS was modeled assuming the most restrictive 24-hour SO₂ modeling cases shown below:

Ground Level Receptors Case 7d, stacks at 0.055 lb/MMBtu, fugitive emissions at 3/5 total (only 3 units operate for this case)

Marina Towers Receptors Case 7f, stacks at 0.055 lb/MMBtu, fugitive emissions at 3/5 total (only 3 units operate for this case)

NAAQS compliance was demonstrated based on the following concentration threshold:
150 µg/m³ (NAAQS) – 40 µg/m³ (Monitored Background) = 110 µg/m³

Modeling results for PRGS sources alone can be found in Attachment B (PM10_ExistingStacks_DEQ.xls).

2. PRGS was modeled with the PM₁₀ “mini” cumulative inventory at receptors within the Significant Impact Area (SIA) and with increased receptor spacing at the ground level to determine the maximum impact location. The “mini” inventory was defined as all background sources with emissions greater than 1 gram per second. The number of receptors and cumulative inventory sources were reduced in this step to expedite model run time.
3. PRGS was modeled with the full PM₁₀ cumulative inventory at receptors around the maximum impact locations found above to ensure maximum impacts were resolved to 100 meters. NAAQS compliance was demonstrated.

Cumulative modeling results can be found in Attachment B (PM10_Cumulative_Inventory_Results_DEQ.xls).

2.1.3. Nitrogen Dioxide (NO₂)

The following process was used to evaluate compliance with the NO₂ NAAQS and to identify the associated complying emission rates:

1. To reduce the total number of model runs, NO₂ modeling of the **merged stack** cases listed below is assumed to demonstrate NAAQS compliance for the “existing stack” scenario. Merged cases 1c-1e are more conservative than any of the existing stack cases because all five units are assumed to be operating, whereas the maximum number of units operating for any given existing stack case is three. Furthermore, because dispersion credit for the stack merge project cannot be given to NO₂, each of the five units was modeled assuming existing stack parameters at the merged stack locations. This is more conservative than modeling a total of three units operating assuming existing stack parameters and existing stack locations.

Ground Level Receptors &	Merged Case 1c, 0.32 lb/MMBtu
Marina Towers Receptors	Merged Case 1d, 0.32 lb/MMBtu
	Merged Case 1e, 0.32 lb/MMBtu

Modeling results for PRGS sources alone can be found in Attachment B (NOx_Results_DEQ.xls).

2. To reduce model run time, the worst of the above merged stack cases was chosen for cumulative NO₂ modeling:

Ground Level Receptors	Merged Case 1d, 0.32 lb/MMBtu
Marina Towers Receptors	Merged Case 1e, 0.32 lb/MMBtu

PRGS was modeled along with the NO₂ cumulative emissions inventory at receptors within 50 km where PRGS had a significant concentration. NAAQS compliance was demonstrated.

Cumulative modeling results can be found in Attachment B (NOx_Cumulative_Inventory_Results_DEQ.xls).

2.1.4. Carbon Monoxide

Due to concerns raised about CO emission factors, an evaluation of available CO test data was conducted. The table below shows all the CO data recorded during particulate matter tests conducted in November and December 2006. Tests were conducted on Unit C2 and Unit C3. The highest test-average CO for each unit is highlighted in the table: 539 ppmv for Unit C2 and 1,040 ppmv for Unit C3.

**CO Data from PRGS Particulate Matter Testing
(December 2006)**

Test #	Unit C2		Unit C3	
	1-Min Max ppm	Test Avg ppm	1-Min Max ppm	Test Avg ppm
1	212	9	1490	1019
2	20	-4	681	359
3	39	0	690	481
4	614	476	615	429
5	306	100	649	485
6	291	111	1484	258
7	237	61	1490	1040
8	109	53	681	366
9	212	10	689	472
10	39	-2	615	435
11	614	427	649	484
12	306	99	1484	262
13	291	107	1324	946
14	66	54	681	401
15	109	53	689	527
16	212	21.9	615	422
17	39	-1	649	483
18	614	539	320	240
19	306	104		
20	291	104		
21	60	55		
22	109	55		

The maximum test-average CO value recorded for Unit C2 (539 ppmv) is lower than the value used in the original 2005 “downwash study”. As a result, it was decided to continue to use the 2005 values for modeling Units C1 and C2 (680.9 and 688.6 respectively). The test-average CO values recorded for Unit C3 are higher than the values used in the August 2005 study, therefore the highest 2006 test-average CO (1,040 ppmv) has been selected for modeling Units C3, C4 and C5. It is also important to note that it is not appropriate to use the single-minute data points in modeling NAAQS standards that are at least one-hour averages or longer.

As with NO₂, dispersion credit for the stack merge project cannot be given for CO. Thus, PRGS was modeled assuming **merged stack** cases 1c-1e, with existing stack parameters and merged stack locations, which is more conservative than any existing stack modeling case. NAAQS compliance was demonstrated.

Modeling results can be found in Attachment B (CO_Results_DEQ.xls).

2.1.5. Toxics (Mercury (Hg), Hydrochloric Acid (HCl) and Hydrogen Fluoride (HF))

Hg, HF and HCl were modeled using maximum 1-hour average emissions. Hg was also modeled using annual average emissions. Impacts were compared to DEQ's Significant Ambient Air Concentrations (SAAC).

Maximum 1-hour emissions for HCl and HF were calculated using the maximum heat input and lb/MMBtu emissions factors developed from stack testing conducted in December 2006. The emission rates used from the stack test data are as follows:

- HCl = 0.00112 lb/MMBtu (Trona on) – 0.09 lb/MMBtu (Trona off)
- HF = 0.000776 lb/MMBtu

Modeling indicates that compliance with the SAAC can be achieved with the following emission rates:

- HCl = 0.021 lb/MMBtu
- HF = 0.0076 lb/MMBtu

It is understood that Trona preferentially controls HCl over SO₂. In order to achieve the aforementioned toxic pollutant complying emission rates, HCl would have to be controlled by at least 77% $((0.09 \text{ lb/MMBtu} - 0.021 \text{ lb/MMBtu} / 0.09 \text{ lb/MMBtu}) \times 100)$. Testing performed at PRGS on Unit C3 December 14, 2006 indicated that Trona injection controlled HCl by 98.7%. During this testing, SO₂ emissions were at 0.29 lb/MMBtu which corresponds to an approximate SO₂ control of 75%. Under all anticipated operating scenarios there is significant excess Trona, on the order of a factor of 10, as would be required to completely react with HCl. Therefore, at least 95 - 99% HCl control is anticipated under all operating scenarios. For example, even assuming 50% SO₂ control, 95 – 99% HCl control is anticipated.

Hg modeled impacts were well below the hourly or annual SAAC for Hg. All toxic pollutant modeling results can be found in Attachment B (AcidGases_ExistingStacks_DEQ.xls and Hg_Results_DEQ.xls).

3. Conclusions

Based on DEQ's review of the modeling analyses, the proposed permit limits would not cause or significantly contribute to a predicted violation of any applicable NAAQS. Attachment B summarizes the proposed complying emission rates for individual units as well as approved combinations of units.

ATTACHMENT B
PRGS PERMIT LIMITS

23. **Process Emission Limits** - Emissions from the operation of the boiler C1 shall not exceed the limits specified below:

Pollutant	lbs/MMBtu (unless noted otherwise)	lbs/MMBtu 24 hr block avg	lbs/Hour	lbs/Day 24 hr block avg
Particulate Matter (PM) including condensable PM	0.055 3 hr block avg	0.055	57.92	1,389.96
PM-10 including condensable PM-10	0.055 3 hr block avg	0.055	57.92	1,389.96
PM-2.5 including condensable PM-2.5	0.055 3 hr block avg	0.055	57.92	1389.96
Sulfur Dioxides (SO ₂)	0.99 3 hr block avg	0.99	1,042.47 3 hr block avg	25,019.28
Oxides of Nitrogen (as NO ₂)	0.32 30 day rolling avg		336.96 30 day rolling avg	
Carbon Monoxide (CO)	680.90 ppmv 3 hr avg		714.93 30 day rolling avg	
Volatile Organic Compounds (VOC)			4.21	
Hydrogen Chloride	0.021		22.11	
Hydrogen Fluoride	0.0076		8.00	

These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits may be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Conditions 14 and 16. This Condition does not relieve the requirement to comply with the operating scenario limits in Condition 28.

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24. **Process Emission Limits** - Emissions from the operation of the boiler C2 shall not exceed the limits specified below:

Pollutant	lbs/MMBtu	lb/MMBtu 24 hr block avg	lbs/Hour	lbs/Day 24 hr block avg
Particulate Matter (PM) including condensable PM	0.055 3 hr block avg	0.055	56.60	1,358.28
PM-10 including condensable PM-10	0.055 3 hr block avg	0.055	56.60	1,358.28
PM-2.5 including condensable PM-2.5	0.055 3 hr block avg	0.055	56.60	1,358.28
Sulfur Dioxides (SO ₂)	1.02 3 hr block avg	0.90	1,049.58 3 hr block avg	22,226.40
Oxides of Nitrogen (as NO ₂)	0.32 30 day rolling avg		329.28 30 day rolling avg	
Carbon Monoxide (CO)	688.60 ppmv 3 hr avg		732.99 30 day rolling avg	
Volatile Organic Compounds (VOC)			4.12	
Hydrogen Chloride	0.021		21.61	
Hydrogen Fluoride	0.0076		7.82	

These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits may be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Conditions 14 and 16. This Condition does not relieve the requirement to comply with the operating scenario limits in Condition 28.

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25. **Process Emission Limits** - Emissions from the operation of the boiler C3 shall not exceed the limits specified below:

Pollutant	lbs/MMBtu	lb/MMBtu 24 hr block avg	lbs/Hour	lbs/Day 24 hr block avg
Particulate Matter (PM) including condensable PM	0.055 3 hr block avg	0.055	55.99	1,343.76
PM-10 including condensable PM-10	0.055 3 hr block avg	0.055	55.99	1,343.76
PM-2.5 including condensable PM-2.5	0.055 3 hr block avg	0.055	55.99	1,343.76
Sulfur Dioxides (SO ₂)	0.80 3 hr block avg	0.66	814.40 3 hr block avg	16,125.12
Oxides of Nitrogen (as NO ₂)	0.32 30 day rolling avg		325.76 30 day rolling avg	
Carbon Monoxide (CO)	1,040.00 ppmv 3 hr avg		1,033.67 30 day rolling avg	
Volatile Organic Compounds (VOC)			4.07	
Hydrogen Chloride	0.021		21.38	
Hydrogen Fluoride	0.0076		7.74	

These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits may be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Conditions 14 and 16. This Condition does not relieve the requirement to comply with the operating scenario limits in Condition 28.
(9 VAC 5-80-850)

26. **Process Emission Limits** - Emissions from the operation of the boiler C4 shall not exceed the limits specified below:

Pollutant	lbs/MMBtu	lbs/MMBtu 24 hr block avg	lbs/Hour	lbs/Day 24 hr block avg
Particulate Matter (PM) including condensable PM	0.055 3 hr block avg	0.055	59.79	1,434.84
PM-10 including condensable PM-10	0.055 3 hr block avg	0.055	59.79	1,434.84
PM-2.5 including condensable PM-2.5	0.055 3 hr block avg	0.055	59.79	1,434.84
Sulfur Dioxides (SO ₂)	0.77 3 hr block avg	0.60	836.99 3 hr block avg	15,652.80
Oxides of Nitrogen (as NO ₂)	0.32 30 day rolling avg		347.84 30 day rolling avg	
Carbon Monoxide (CO)	1040.00 ppmv 3 hr avg		994.79 30 day rolling avg	
Volatile Organic Compounds (VOC)			4.35	
Hydrogen Chloride	0.021		22.83	
Hydrogen Fluoride	0.0076		8.26	

These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits may be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Conditions 14 and 16. This Condition does not relieve the requirement to comply with the operating scenario limits in Condition 28.

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27. **Process Emission Limits** - Emissions from the operation of the boiler C5 shall not exceed the limits specified below:

Pollutant	lbs/MMBtu	lbs/MM Btu 24 hr block avg	lbs/Hour	lbs/Day 24 hr block avg
Particulate Matter (PM) including condensable PM	0.055 3 hr block avg	0.055	60.89	1,461.24
PM-10 including condensable PM-10	0.055 3 hr block avg	0.055	60.89	1,461.24
PM-2.5 including condensable PM-2.5	0.055 3 hr block avg	0.055	60.89	1,461.24
Sulfur Dioxides (SO ₂)	0.70 3 hr block avg	0.53	774.90 3 hr block avg	14,081.04
Oxides of Nitrogen (as NO ₂)	0.32 30 day rolling avg		354.24 30 day rolling avg	
Carbon Monoxide (CO)	1040.00 ppmv 3 hr avg		968.75 30 day rolling avg	
Volatile Organic Compounds (VOC)			4.43	
Hydrogen Chloride	0.021		23.25	
Hydrogen Fluoride	0.0076		8.41	

These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits may be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Conditions 14 and 16. This Condition does not relieve the requirement to comply with the operating scenario limits in Condition 28.
(9 VAC 5-80-850)

28. Process Emission Limits – Multiple Operating Scenarios - Emissions for the operation of combination unit operations shall not exceed the limits specified below.

The operating scenarios listed below may be expanded as Mirant has suggested that there are additional scenarios that they would like to propose that will be NAAQS complaint and will provide the facility with additional flexibility.

Operating Scenario	SO ₂ 3 hr block avg lbs/MMBtu per unit	SO ₂ 3 hr block avg lbs/Hr	SO ₂ 24 hr block avg lbs/MMBtu	SO ₂ 24 hr block average lbs/Day
2 cycling	0.50	1,041.00	0.48	23,984.64
2 base	0.37	811.78	0.28	14,743.68
1 cycling/1 base	0.42	907.20	0.36	18,662.40
2 cycling/ 1 base	0.29	924.81	0.27	20,664.72
1 cycling/ 2 base	0.27	876.69	0.23	17,923.44
3 base	0.25	803.00	0.21	16,188.48

Operating Scenario	PM 1 hr avg Lb/MM Btu	PM 1 hr avg Lb/Hr	PM 24 hr block avg Lb/MM Btu	PM 24 hr block avg Lb/Day
Max value for any case	0.055	178.59	0.055	4,286.04

Operating Scenario	PM ₁₀ 1 hr avg Lb/MM Btu	PM ₁₀ 1 hr average Lb/Hr	PM ₁₀ 24 hr block avg Lb/MM Btu	PM ₁₀ 24 hr block avg Lb/Day
Max value for any case	0.055	178.59	0.055	4,286.04

Operating Scenario	PM _{2.5} 1 hr average Lb/MM Btu	PM _{2.5} 1 hr avg Lb/Hr	PM _{2.5} 24 hr block avg Lb/MM Btu	PM _{2.5} 24 hr block avg Lb/Day
Max value for any case	0.055	178.59	0.055	4,286.04

Operating Scenario	NO _x 1 hr avg Lb/MM Btu (30-day rolling avg.)	NO _x 1 hr avg Lb/Hr (30 day rolling avg)	NO _x 24 hr average Lb/MM Btu	NO _x 24 hr average Lb/Day
Max value for any case	0.32	1,039.04		

Operating Scenario	CO 1 hr avg Lb/MM Btu	CO1 hr avg Lb/Hr	CO 24 hr block avg Lb/MM Btu	CO 24 hr block avg Lb/Day
Max value for any case		2,997.20		

Operating Scenario	HCl 1 hr avg Lb/MM Btu	HCl 1 hr avg Lb/Hr	HCl 24 hr average Lb/MM Btu	HCl 24 hr avg Lb/Day
Max value for any case	0.021	68.19		

Operating Scenario	HF 1 hr avg Lb/MM Btu	HF1 hr avg Lb/Hr	HF 24 hr avg Lb/MM Btu	HF 24 hr avg Lb/Day
Max value for any case	0.0076	24.68		

These tables were developed using the worst case scenario of operating combination of units which would exhibit the worse case emissions.

These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits may be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Conditions 14 and 16.

(9 VAC 5-80-850)